APPENDIX E: ENVIRONMENTAL ANALYSIS

Environmental Analysis

The consultants utilized existing in-house reports and Environmental FirstSearch Reports from the project area to prepare this portion of the feasibility study. Many of the reports are in-house at S E A's Cambridge Office and are readily available for future reference.

Based on a desktop review of readily available environmental records, Polyaromatic Hydrocarbons (PAHs), Petroleum Hydrocarbons, and metals are likely present in the surface soils along the proposed route of the bike path.

Table E-1 summarizes several environmental sites that are in the vicinity of the proposed trail route. Sheets 1-7 at the end of this section contain figures depicting the locations of the sites that are summarized in the table. The sites have been identified with letter symbols corresponding to the entries in **Table E-1, left column.** Shaded Rows indicate that additional information for these entries would have to be obtained from the State DEP. Non-shaded rows indicate that information for these entries is readily available from S E A Consultants in Cambridge.

Many of the reports reviewed contained information from local file reviews including City of Cambridge Fire Department and the Cambridge Historical Commission. S E A interviewed MIT personnel in the course of preparing several of the Phase I reports referenced in **Table 3-1.**

One significant report prepared by S E A is entitled "MIT Utility Design and Construction Oil and Hazardous Materials Investigation", dated September 22, 1999. This report contains detailed information about surrounding listed DEP sites, as well as analytical data for all of S E A's subsurface investigations along the CSX Railway and Vassar St. A total of 40 borings were completed along the CSX Railway and Vassar St. between the intersections of Amesbury St. and Vassar St. to the intersection of Main St. and Vassar St.

Table E-1 Summary of DEP Listed Sites

Figure Page/ Ref.	Report Date/ Release Date	Report Title or Site Status	Street Address or MIT Building Number	Prepared by/ Information Source
1-4 of 7 A	9/22/99	MIT Utility Design and Construction Oil and Hazardous Materials Investigation	Along Vassar St. + CSX Railway	S E A Consultants Inc.
1 of 7 B	12/95	MA DEP issued RTN 3-13203 resulting from a 72-hr release of No. 2 Fuel Oil in 12/95. An IRA was performed and a Class A-2 RAO was achieved in 9/96.	351 Vassar St.	Environmental FirstSearch Report (201 Vassar St. Phase I Report prepared by SE Consultants 1/01)
1 of 7 C	5/98	MA DEP issued RTN 3-16747 resulting from a 2-hr release of unknown chemical of type -oil (approx. 20 gallons) in 5/98. An IRA was performed and a Class A-2 RAO was achieved in 7/98.	351 Vassar St.	Environmental FirstSearch Report (from 201 Vassar St. Phase I Report prepared by S E A Consultants 1/01)

Figure Page/ Ref.	Report Date/ Release Date	Report Title or Site Status	Street Address or MIT Building Number	Prepared by/ Information Source
2 of 7 D	3/4/98	Geoenvironmental Data Report 289 Vassar Street Cambridge, Massachusetts	289 Vassar Street MIT Bldg. W-89	McPhail Associates, Inc.
2 of 7 E	1/99	Report on Preliminary Geotechnical Engineering and Environmental Investigation Proposed Vassar Street Student Housing Massachusetts Institute of Technology Cambridge, Massachusetts	229 Vassar St.	Haley & Aldrich
2-3 of 7 F	1/01	Phase I Site Investigation Report for 201 Vassar St.	201 Vassar St.	S E A Consultants Inc.
3 of 7 G	1/01	Response Action Outcome Statement for Petroleum Hydrocarbons Release on the CSX Railway Right-of-Way RTN 3-19197	Approx. 760 feet West of Mass. Ave. along CSX Railway	S E A Consultants Inc
3 of 7 H	7/28/97	Phase III - Phase III Comprehensive Environmental Site Assessment Report North Side of Johnson Athletic Center 120 Vassar Street Cambridge, MA (RTN No. 3-4032)	120 Vassar Street MIT Bldg W-34	Gemini Geotechnical Associates, Inc.
3 of 7 I	9/98	Preliminary Report on Geotechnical Engineering and Environmental Investigation Proposed Central Athletic Facility Massachusetts Institute of Technology Cambridge, MA (RTN 3-17627)	100 Vassar Street	Haley & Aldrich
3 of 7 J	1/23/98	Immediate Response Action Completion Statement RTN 3-14935 and Phase I Initial Site Investigation Report RTN 3-14935	270 and 290 Albany St.	Clean Harbors Environmental Services, Inc.
3 of 7 K	1/01 12/02	Phase I Initial Site Investigation for CSX Railway West of Massachusetts Ave. RTN 3-19199 and Class A-1RAO Statement	Approx. 240 feet West of Mass. Ave. along CSX Railway	S E A Consultants Inc.
3-4 of 7 L	12/99	Utility Related Abatement Measure Plan and Completion Statement for Utility Installation along CSX Railway.	CSX Railway Easement (Main St. to Mass. Ave)	S E A Consultants Inc.
4 of 7 M	2/11/99	Phase I Limited Site Investigation Building 41A, 73-83 Vassar St. and 133-139 Massachusetts Ave. Cambridge, Massachusetts	73-83 Vassar St. and 133-139 Massachusetts Ave.	McPhail Associates, Inc.
4 of 7 N	1/3/02	Phase I Initial Site Investigation for 60 Albany St. RTN 3-19136	60 Albany St.	S E A Consultants Inc.

Figure Page/ Ref.	Report Date/ Release Date	Report Title or Site Status	Street Address or MIT Building Number	Prepared by/ Information Source
4 of 7 O	10/29/96	Soil Disposition Plan MIT Building 16N Addition Cambridge, Massachusetts	60 Albany St. MIT Bldg N16	McPhail Associates, Inc.
4 of 7 P	4/9/99	Release Abatement Measure Plan (RTN 3-10471) Proposed Albany Street Garage 50 Albany Street Cambridge, Massachusetts	50 Albany St.	McPhail Associates, Inc.
4 of 7 Q	7/8/99	Foundation Engineering Report MIT Building 42 Addition Cambridge, Massachusetts	59 Vassar St. MIT Bldg 42	McPhail Associates, Inc.
4 of 7 R	12/30/98	Subsurface Conditions and Preliminary Foundation Recommendations Proposed Stata Center Massachusetts Institute of Technology Cambridge, Massachusetts	10-40 Vassar Street Former Building 20	Haley & Aldrich
4 of 7 S	10/7/83 1/18/86	Transformer Oil and Isopropyl Alcohol spills occurred on these dates respectively. DEP assigned spill Ids N83-0321 and N86-0044 to these releases.	600 Main St. Polaroid Corp.	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
4 of 7 T	4/15/87	A release of 1 gallon of Transformer Oil spill occurred on 4/15/87. DEP assigned spill ID N87-0501 to this release.	545 Technology Square	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
4 of 7 U	12/15/99	MA DEP issued RTN 3-19076 resulting from a 120-day reporting conditions for TPH, Lead, PAHs, and Cyanide in soils.	Blds. 100-700 Technology Square	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
5 of 7 V	7/31/97	MA DEP issued RTN 3-19076 resulting from a 120-day reporting conditions for TPH, Metals, and PAHs in soils.	346 Binney St.	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
5 of 7 W	7/31/97	MA DEP issued RTN 3-2275 resulting from a previous listing on DEPs Locations to be Investigated (LTBI) List. The site is currently listed as Tier II status.	1 Kendall Square	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
6 of 7 X	5/17/94	MA DEP issued RTN 3-0748 resulting from a groundwater release threat. The site is currently listed as pending no further action.	71 Fulkerson St.	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
6 of 7 Y	1/15/89	MA DEP issued RTN 3-1907 resulting from a previous listing on DEPs Locations to be Investigated (LTBI) List. The site is currently listed as a default Tier IB status.	217 Thorndike St.	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)

Figure Page/ Ref.	Report Date/ Release Date	Report Title or Site Status	Street Address or MIT Building Number	Prepared by/ Information Source
7 of 7 Z	1/3/01	MA DEP issued RTN 3-20456 resulting from a 120-day reporting conditions for PAHs in soils. This site has been closed with a Class B-2 RAO.	30 Medford St. Somerville, MA	Environmental FirstSearch Report (from 60 Albany St. Phase I Report prepared by S E A Consultants 1/02)
Shaded Rows indicate that additional information for these entries would have to be obtained from the State DEP. Non-shaded rows indicate that information for these entries is readily available from S E A Consultants in Cambridge.				

Based upon information gathered from completed field investigations, analytical results, and records review, the following observations apply:

- Reportable Concentrations of PAHs, Petroleum Hydrocarbons, or Metals under 310 CMR 40.000 are likely present in the soils at many of the sites within the route and within close proximity to the proposed trail.
- Evidence of subsurface contamination from both known and unknown sources of oil and hazardous materials was observed or detected in the soil and groundwater samples collected by
  S E A as specified in the report "MIT Utility Design and Construction Oil and Hazardous Materials Investigation", prepared by S E A and included in Attachment 2.
- Due to the strong likelihood of the presence of contaminants, pre-characterization of the soils within the proposed trail should be performed primarily to assess the risk to construction workers, and to verify the presence and concentrations of contaminants. The number of pre-characterization samples necessary would be approximately 20 samples assuming a total trail length of 10,000 feet (1 sample/500 feet). The samples should be tested for arsenic, lead, and extractable petroleum hydrocarbons with target analytes.
- The presence of contaminants in the soil could pose a hazard to both the construction workers and the public welfare during trail construction. The main route of entry of contaminants would be through inhalation (air intake vents on buildings near the proposed bike path, construction workers exposed to dusts, etc.).
- A site-specific Health and Safety Plan (HASP) should be developed based on pre-characterization data to minimize the hazards to construction workers and the public during trail construction.
- Construction methods should be specified to minimize handling soils, to minimize the creation of an excess volume of soils, and to minimize the exposure of soils to construction workers and the public. Possible construction methods would include:

    1. Wetting soils with water prior to excavation to minimize generating dust;
    2. Utilizing excess soils underneath the proposed bike path to the maximum extent possible by raising the final grade of the pathway;

3. Spreading soils with acceptable contaminant levels along the sides of the proposed bike path;

4. Mixing existing soils with structurally supportive soils to make the soils geotechnically suitable for reuse as a base for the proposed bike path to minimize excavation and removal;

5. Stabilizing either side of the proposed bike path with packed stone dust to minimize the public's future contact with the soil;

6. Installing fencing between the existing railroad rails and the proposed bike path to maximize safety of trail users from the railway and to minimize exposure of trail users to surface soils on the railway; and

7. Using landscaping techniques to cover the soils near the proposed bike path, thus limiting the exposure to the public.

- A modest amount of excess soils will likely be generated requiring proper disposal. Any soil destined for disposal must be sampled for full disposal characterization analytical data. It is usually required to characterize each 500 yd^3 of soil for disposal. The concentrations of contaminants in the soil will dictate the method and location for disposal. Approximate costs for disposal of different soils are listed below:

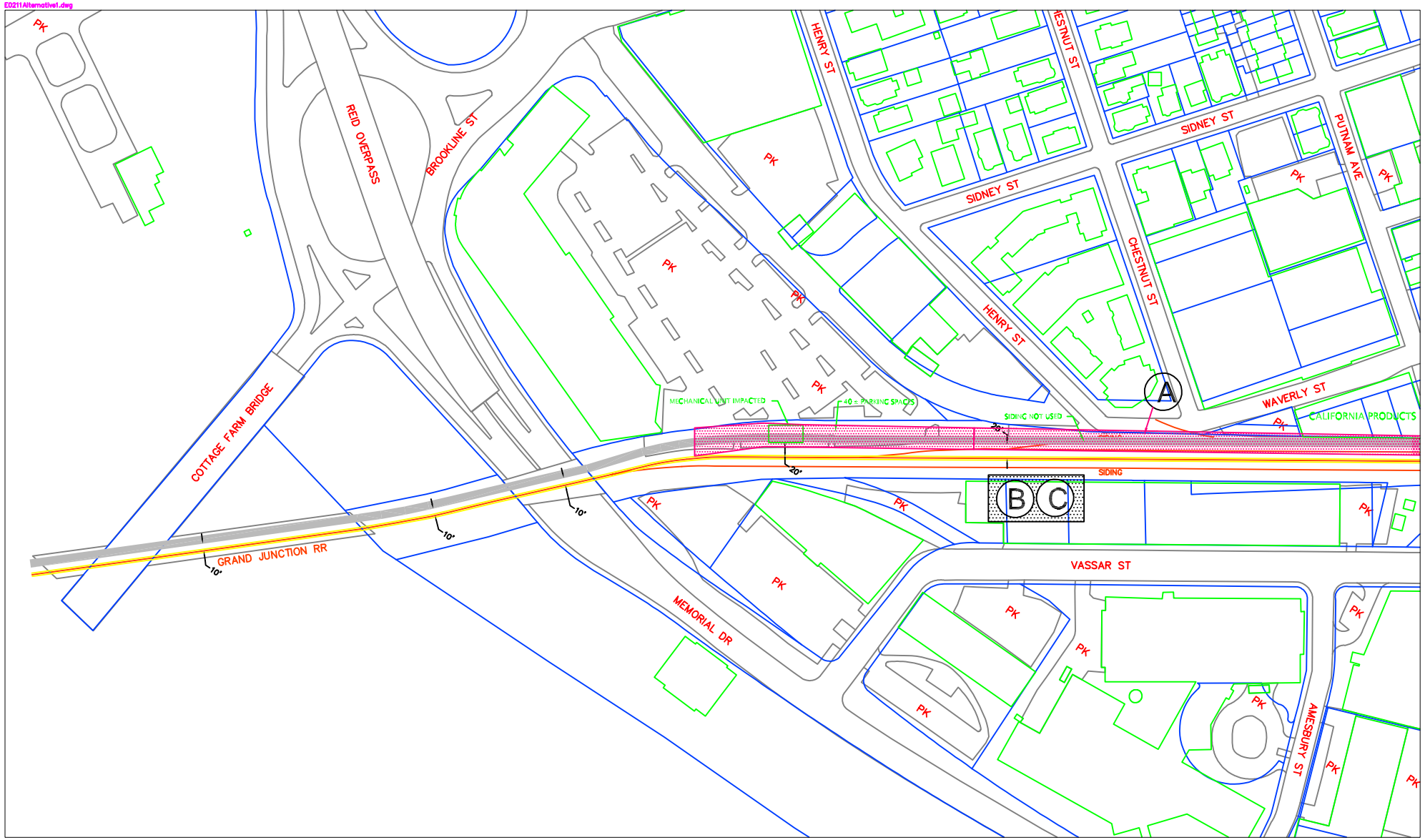
    8. Costs for transportation and disposal at an unlined landfill range from $30-35/ton.

    9. Costs for transportation and disposal at a lined landfill range from $40-45/ton.

    10. Costs for transportation and disposal at an asphalt batch plant range from $45-60/ton.

    11. Costs for transportation and disposal of RCRA hazardous waste is approximately $215/ton.

- The quantity of material disposed will determine the number of samples requiring full disposal characterization at a maximum of 500 yd^3 per sample. Assuming a modest amount of excess soils would be generated, the most cost-effective method would be to stockpile the excess soils accordingly and sample the stockpile for full characterization. The volume of the soil stockpile will dictate the number of samples needed (i.e., 300 yd^3 would require 1 full characterization sample; 600 yd3 would require 2 full characterization samples). The cost for full characterization analytical testing is approximately $800/sample.



KEY

Letters correspond to left hand column of Table E-1

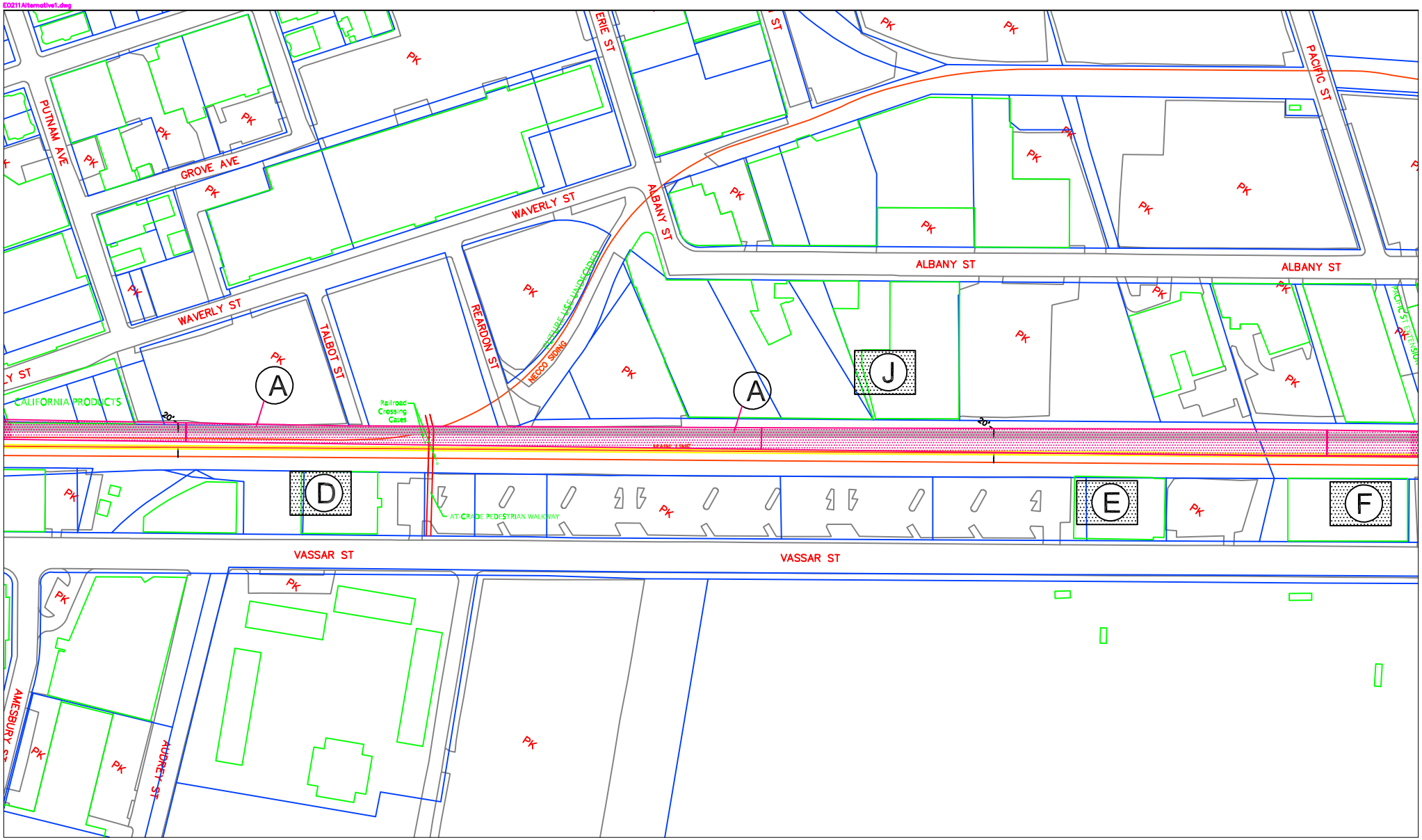
SHEET 1 OF 7
1"=60'

Source: City of Cambridge Community Development Department
*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA



KEY

Letters correspond to left hand column of Table E-1

SHEET 2 of 7

1"=60'

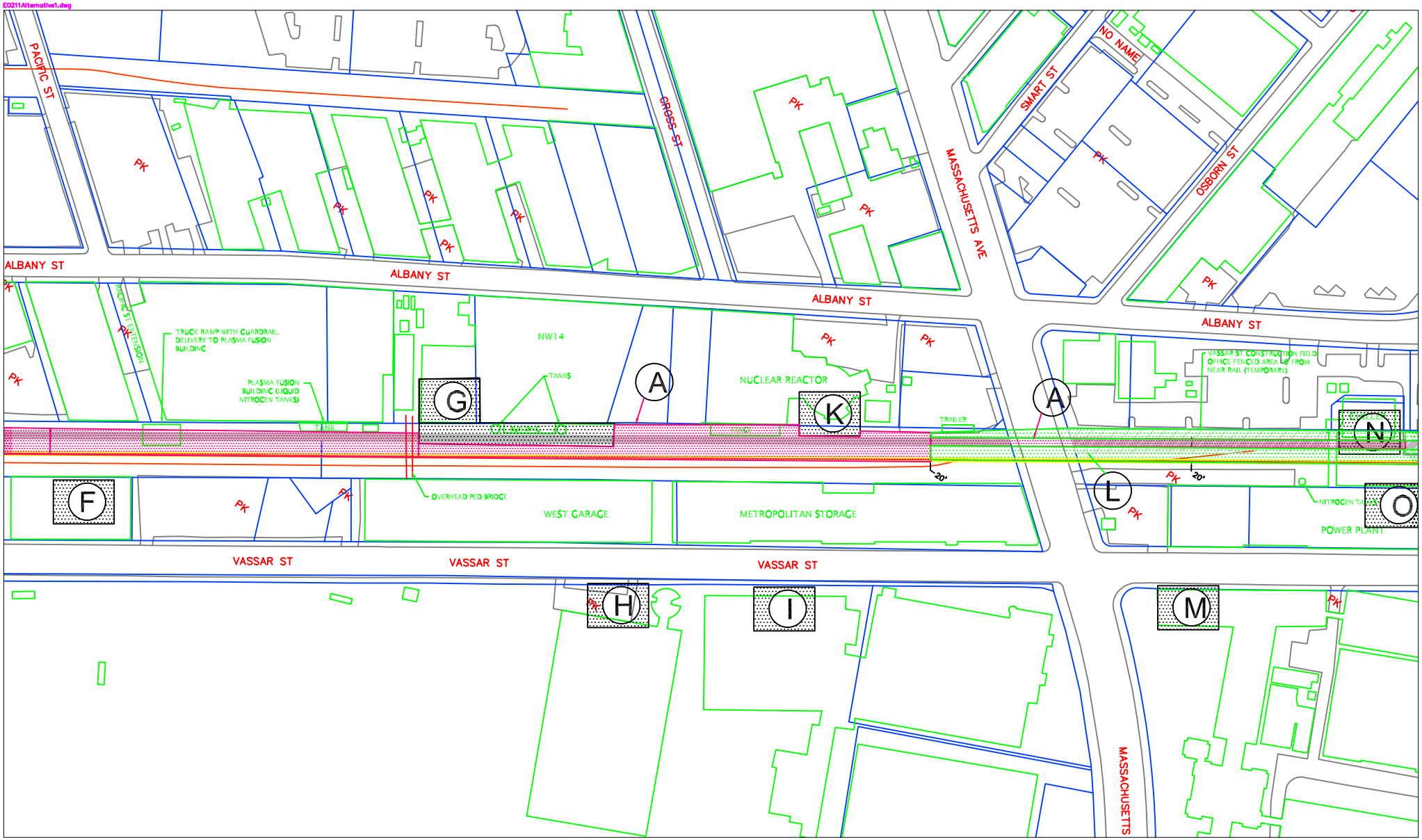
Source: City of Cambridge Community Development Department

*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA



KEY

Letters correspond to left hand column of Table E-1

SHEET 3 of 7

1"=60'

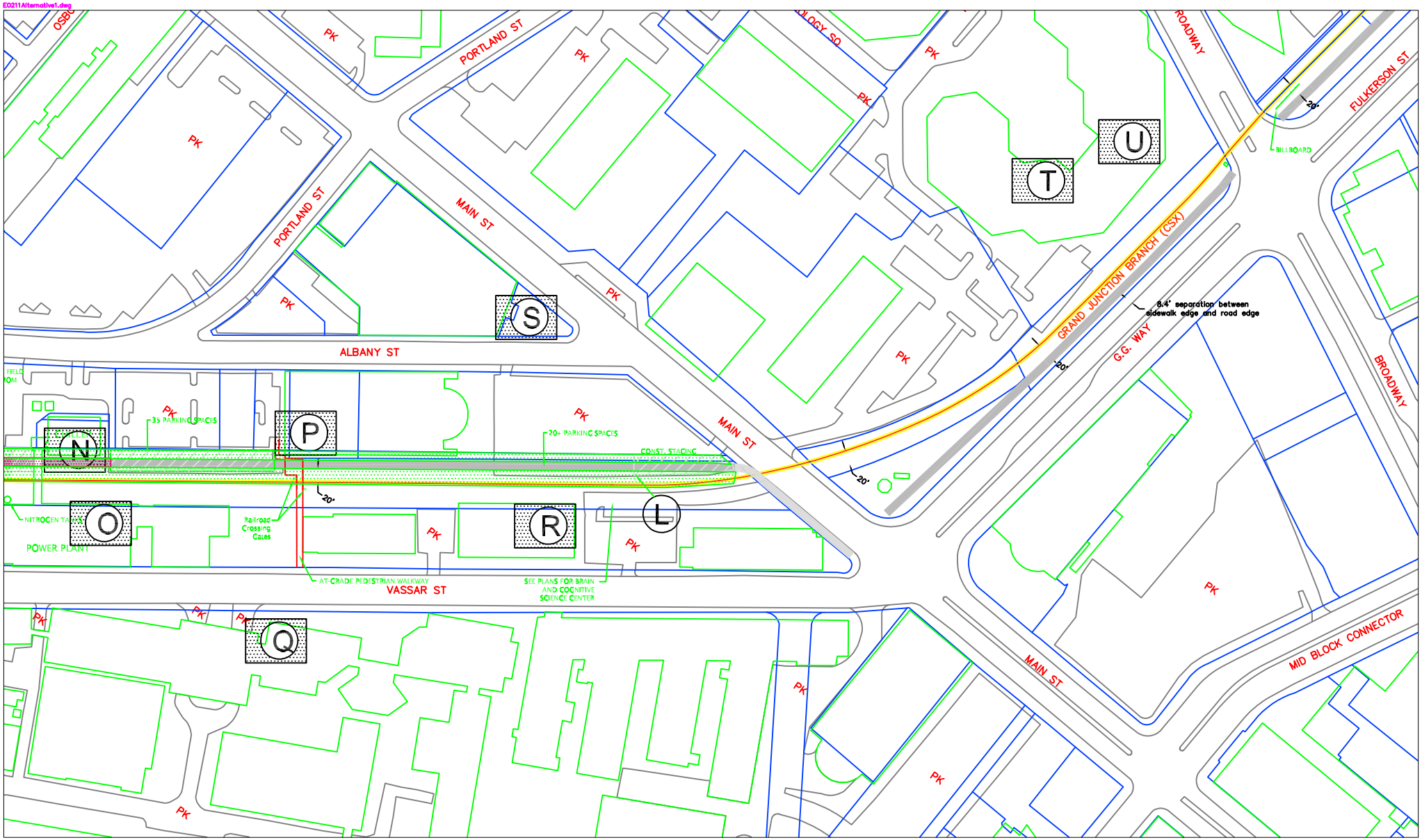
Source: City of Cambridge Community Development Department

*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA



KEY

Letters correspond to left hand column of Table E-1

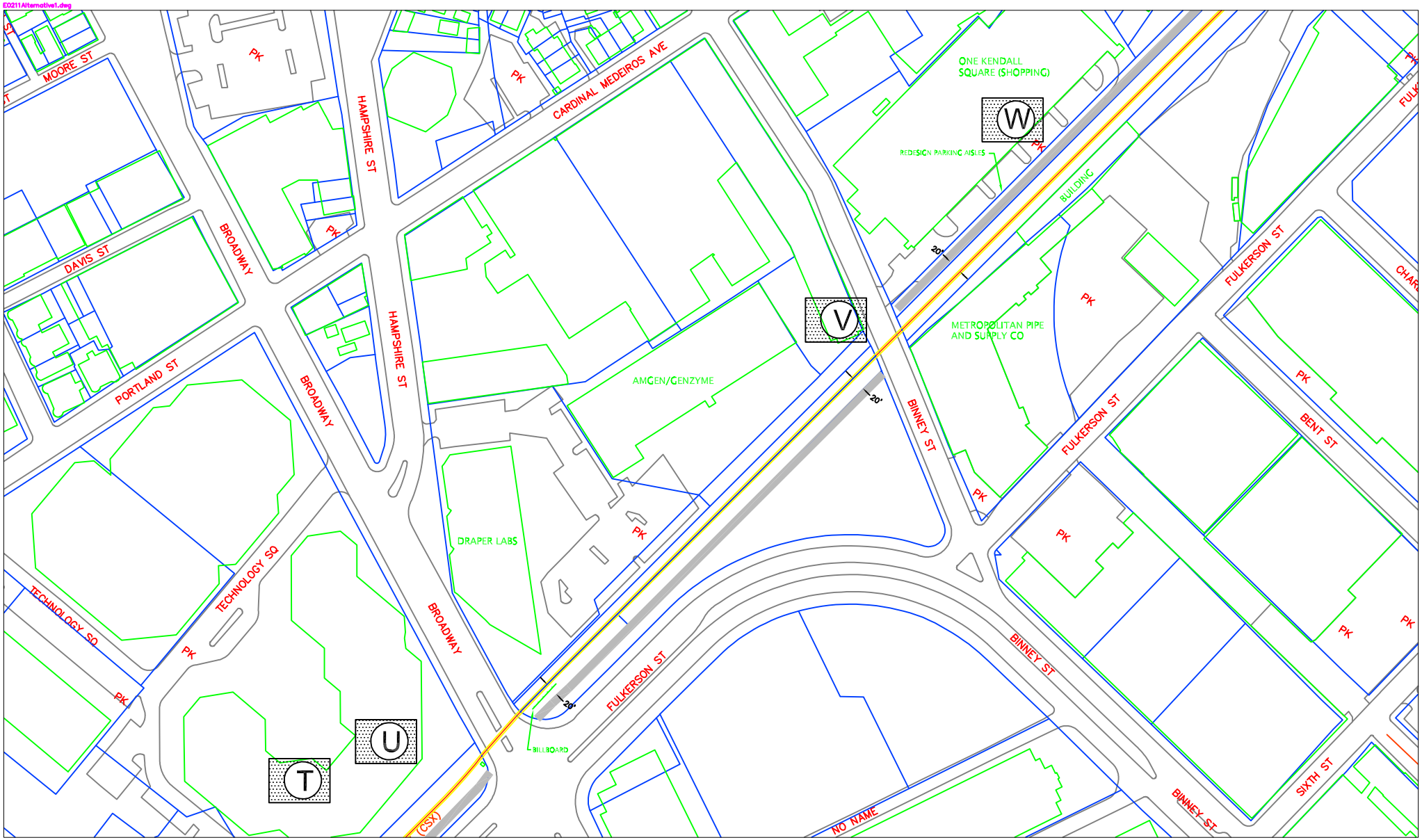
SHEET 4 of 7
1"=60'

Source: City of Cambridge Community Development Department
*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA



KEY

Letters correspond to left hand column of Table E-1

SHEET 5 of 7

1"=60'

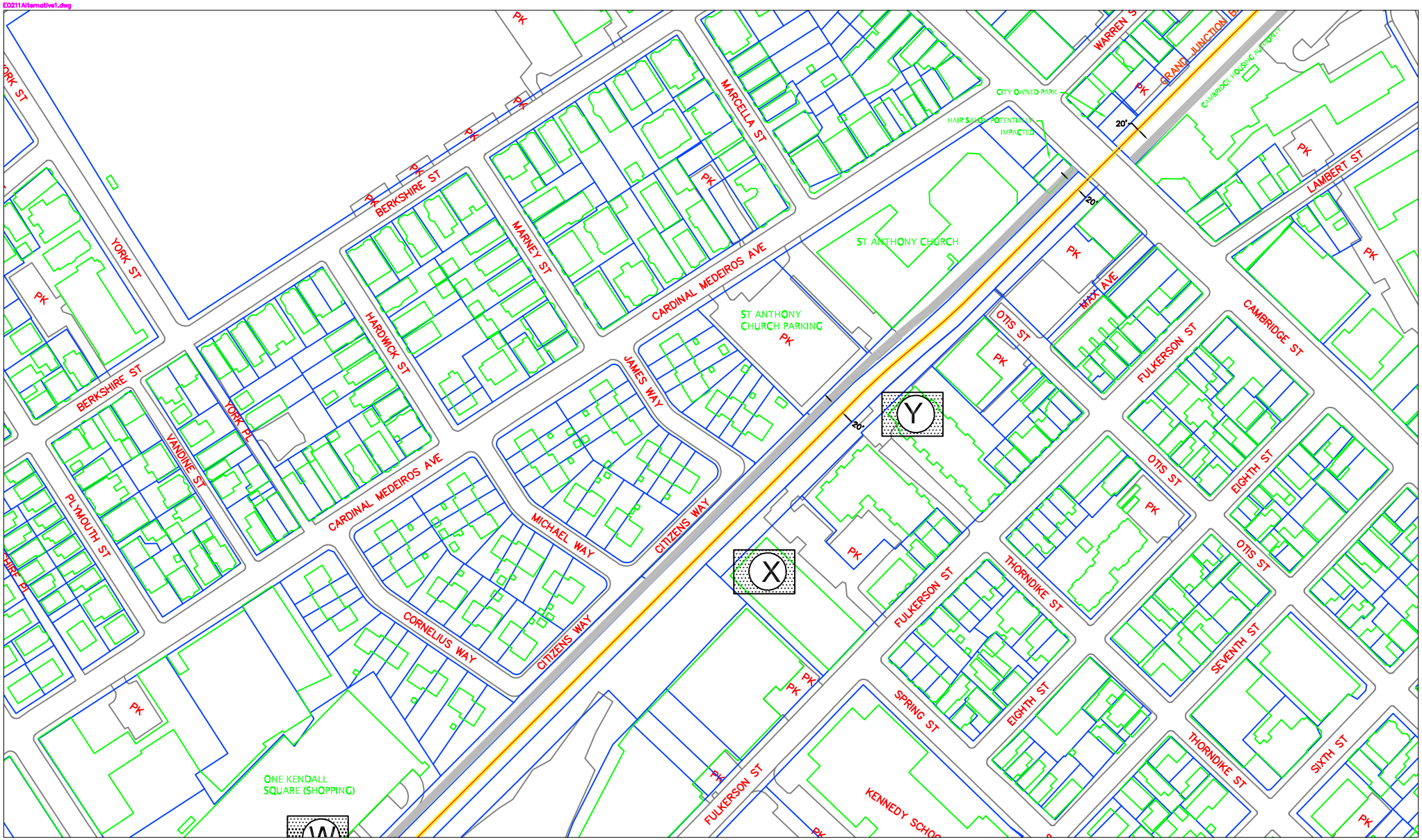
Source: City of Cambridge Community Development Department

*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA



KEY

Letters correspond to left hand column of Table E-1

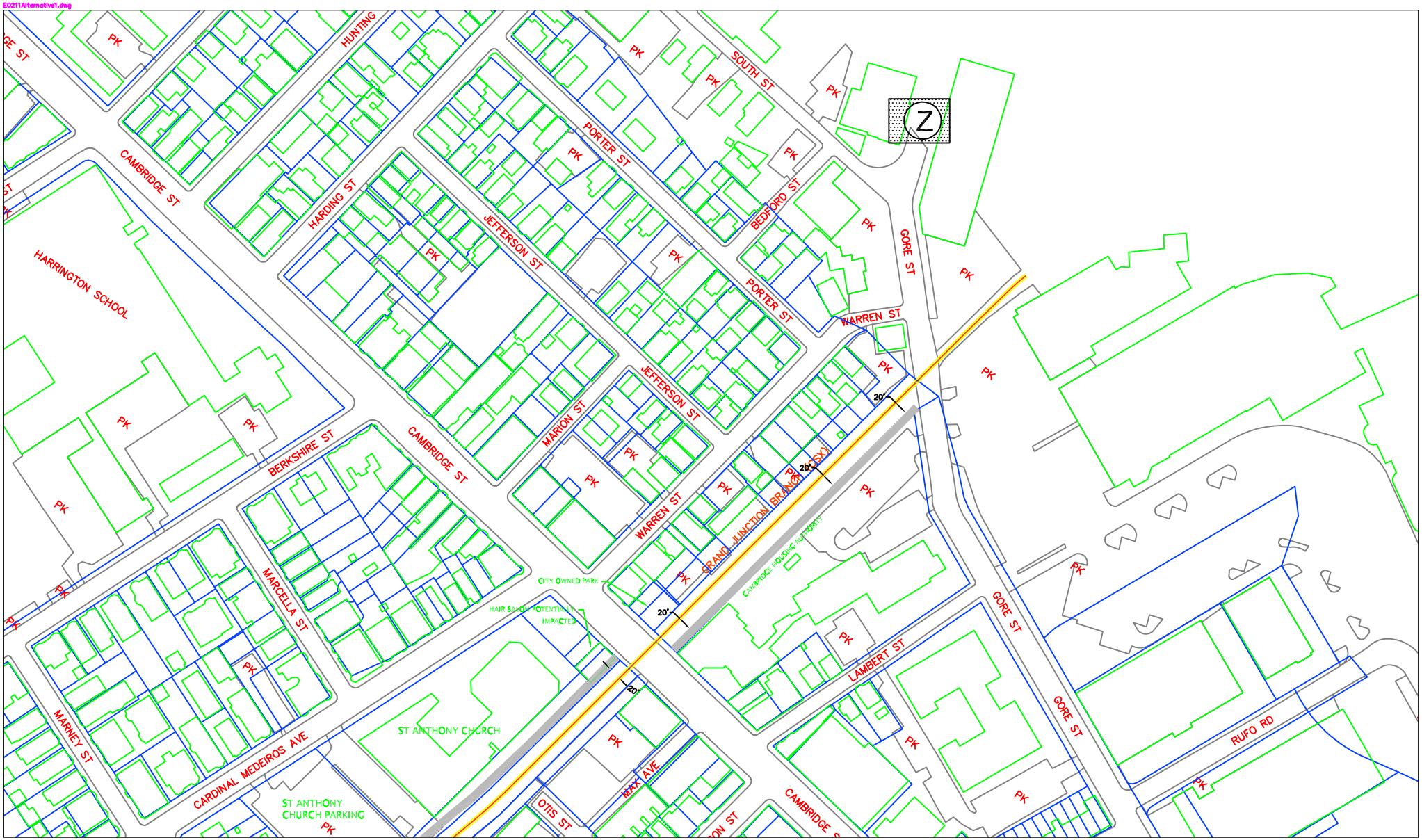
SHEET 6 of 7
1"=60'

Source: City of Cambridge Community Development Department
*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA



KEY

Letters correspond to left hand column of Table E-1

SHEET 7 of 7

1"=60'

Source: City of Cambridge Community Development Department

*No Urban Ring on Surface in Corridor

Grand Junction Rail with Trail

Alternative 1: Concept Plan*

Cambridge, MA

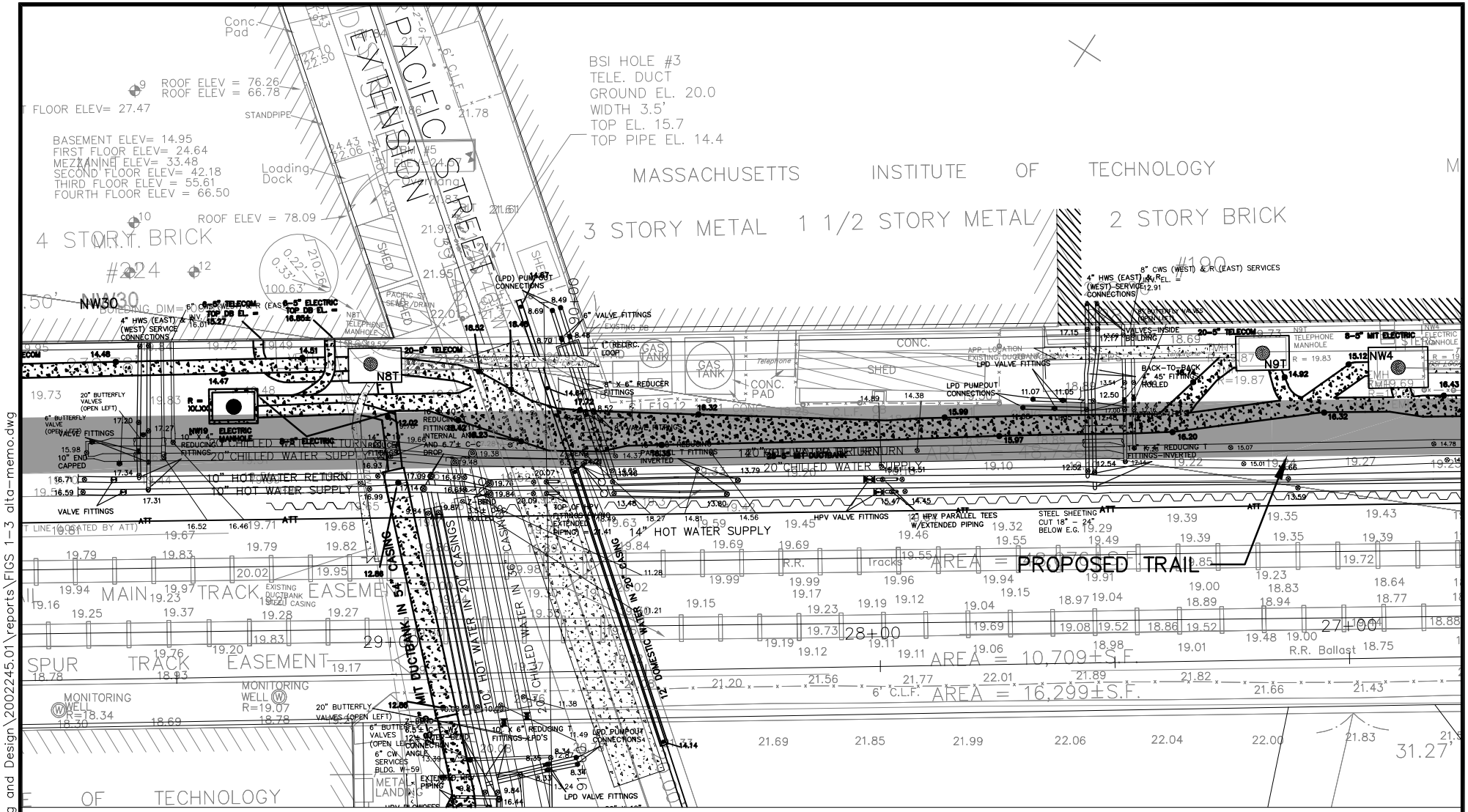


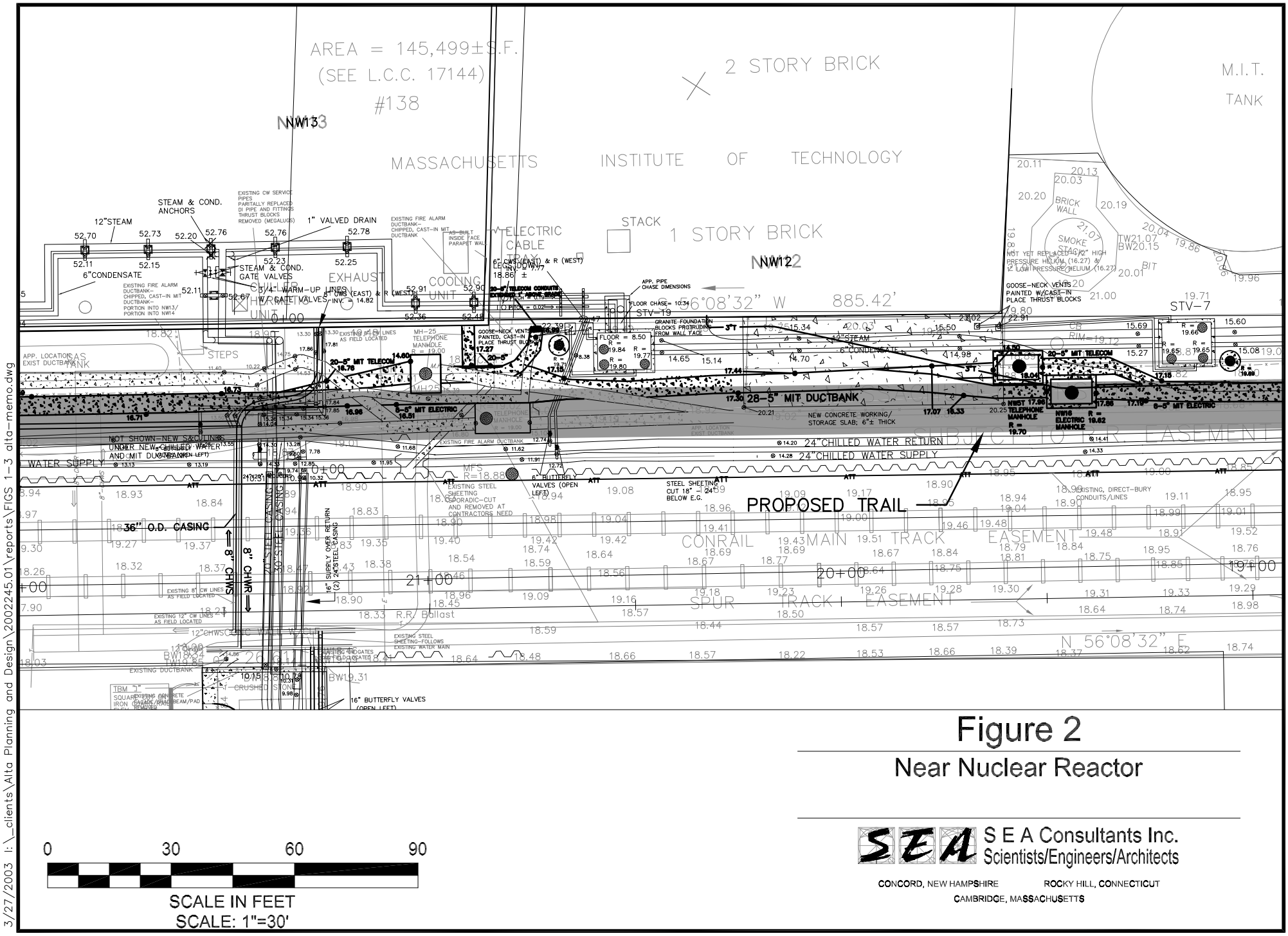
Figure 1

Pacific Street Extension

S E A Consultants Inc.
Scientists/Engineers/Architects

CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS

3/27/2003 i:_clients\Alta Planning and Design\2002245.01\reports\FIGS 1-3 alta-memo.dwg



0 30 60 90

SCALE IN FEET
SCALE: 1"=30'

Figure 2

Near Nuclear Reactor

S E A Consultants Inc.
Scientists/Engineers/Architects

CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS

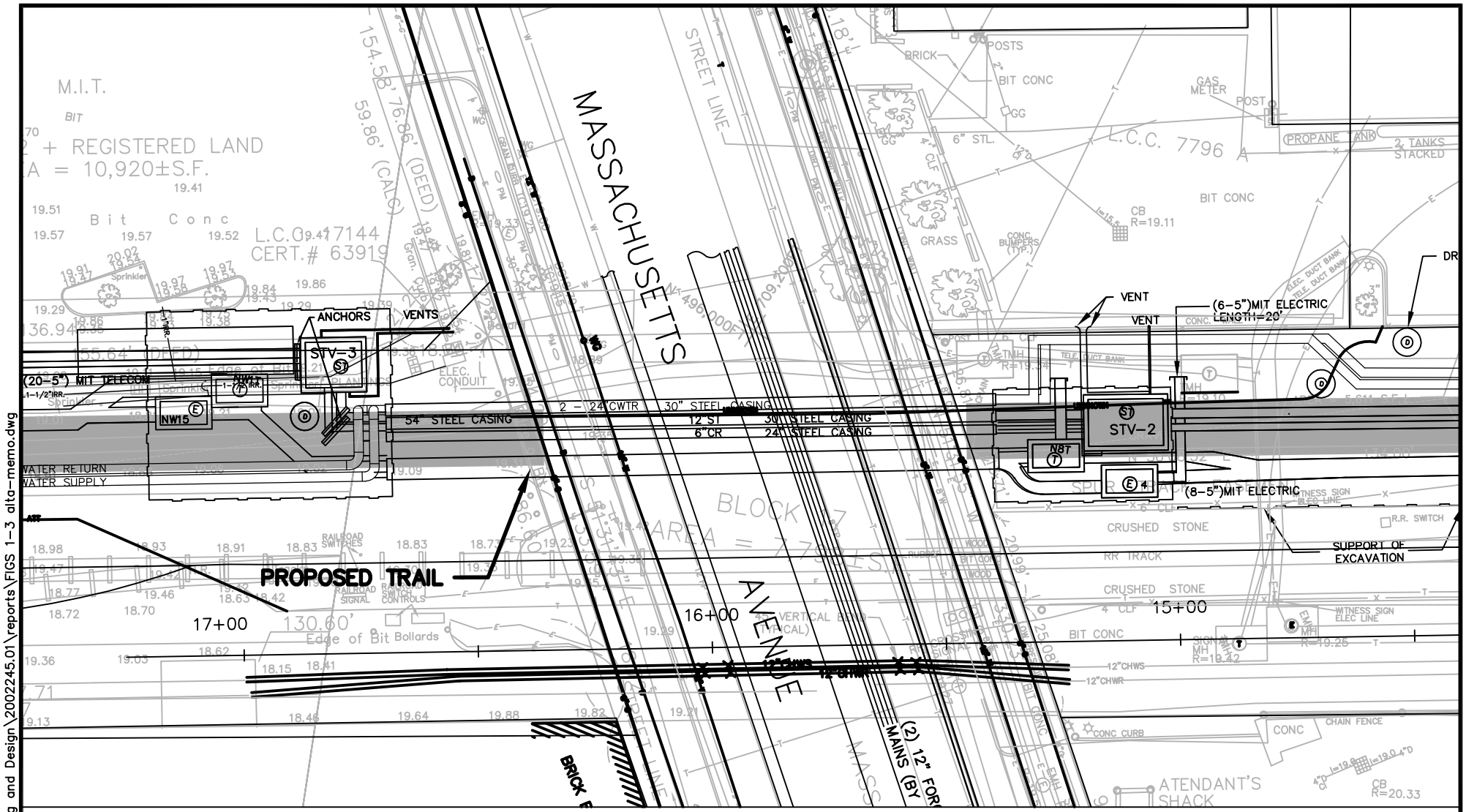


Figure 3

Massachusetts Avenue Crossing

0 30 60 90

SCALE IN FEET
SCALE: 1"=30'

S E A Consultants Inc.
Scientists/Engineers/Architects

CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS

Figure 4

Between Broadway and Binney

S E A Consultants Inc.
Scientists/Engineers/Architects

CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS